

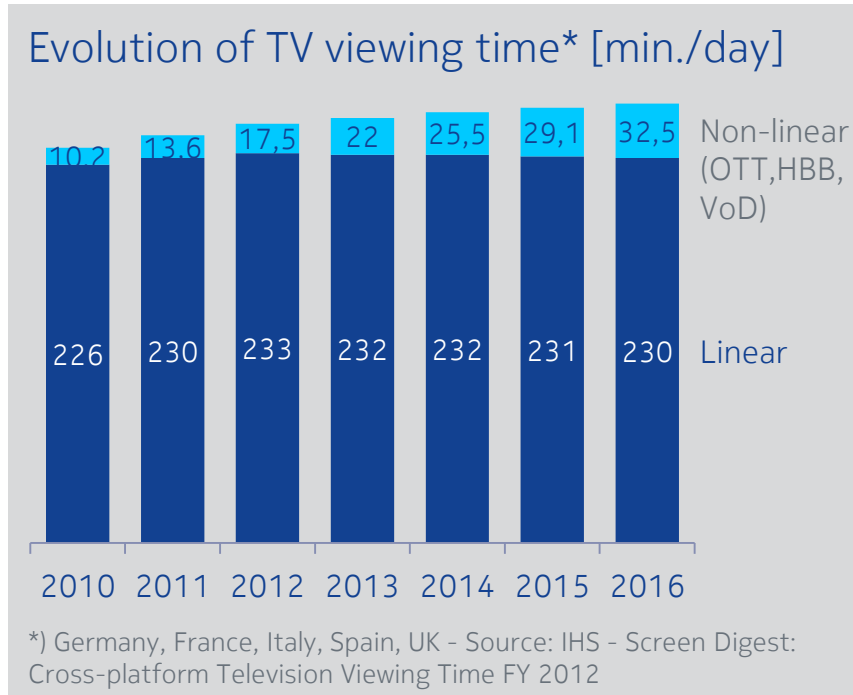
# LTE for broadcast

## Broadband broadcast convergence

- September 2015

## TV is here to stay

LTE for broadcast – the next big thing in the telecom and media industry?



Increasing interest in LTE broadcast from mobile operators, broadcasters and car manufacturers

TV is the medium used most by Europeans

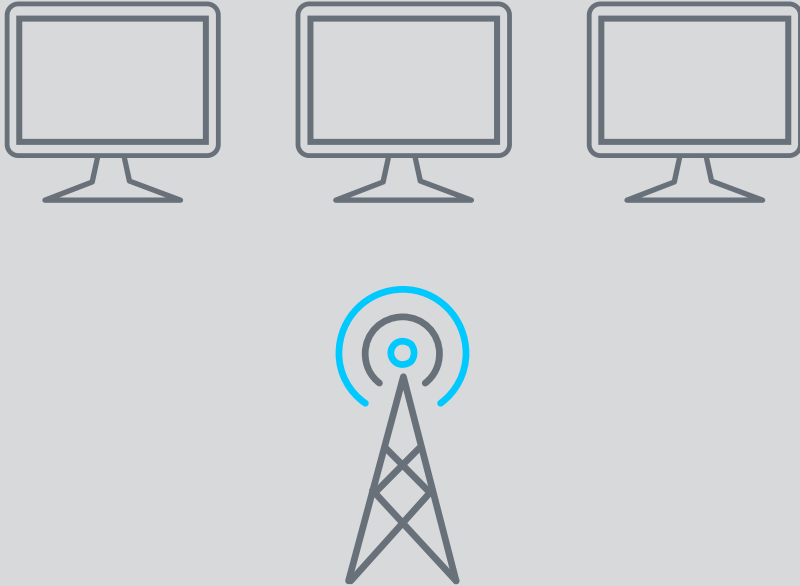
**87%** say they watch it every day or almost every day

Source: Standard Eurobarometer 80, November 2013

# LTE 4 broadcast supports the full range of devices

Nokia Networks has started a wide-area trial in July 2014

## Digital terrestrial television (DTT)



## LTE 4 broadcast



# LTE for broadcast builds on existing infrastructure and ecosystem

## Digital terrestrial television

- > DVB-T, ATSC, ISDB-T & DTMB
- > Lacking of interest from handset manufacturers and media industry
- > High towers lead to a waste of spectrum
- > Multiple Frequency Network (MFN) required to cover large areas
- > More expensive than satellite but cheaper than cable



## LTE for broadcast

- > Single global standard
- > Widest range of devices, latest CODECs, huge number of established BTS sites
- > Massively improved UHF spectrum utilization
- > Single Frequency Network (SFN) for national, regional and local service areas
- > Cost comparable to DTT, but higher flexibility (data rates, services, interactivity)



# LTE for broadcast creates a quadruple win scenario

Broadcasters

**Reach**

Extend reach to smart devices of digital natives

End users

**Choice**

Enjoy wide choice of interactive TV and video offerings anywhere

Mobile operators

**Expand**

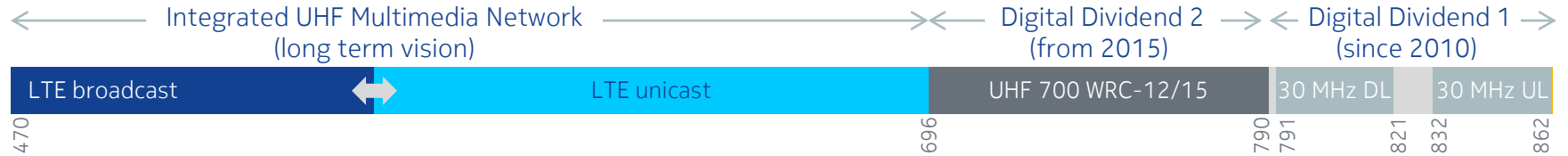
Expand offering by cooperating with broadcast operators

Regulators

**Balance**

Ensure affordable access to broadband services for everyone

# LTE makes best use of the valuable spectrum below 700 MHz



LTE broadcast for up to 25 TV channels covering the most popular programs including public service broadcast

Massive capacity for non-linear content (Video on-demand, niche channels and a multitude of MBB services)

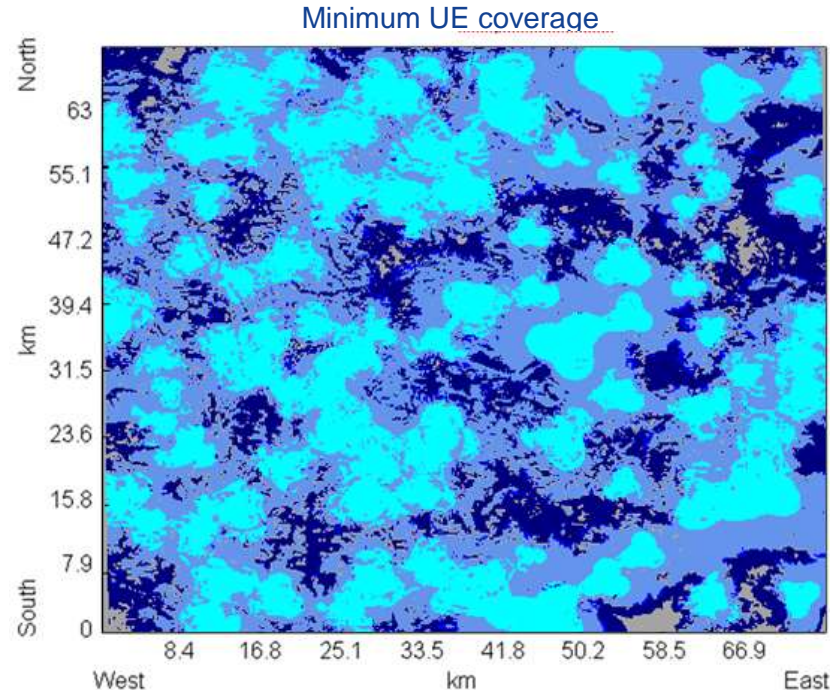
Dynamic spectrum allocation between broadcast and unicast = full flexibility



# Unique experience with Single Frequency Networks (SFN)

## Excellent coverage of large areas

- **Indoor handheld**  
 Population: 55.8 %  
 Area: 32.7 %
- **Outdoor handheld**  
 Population: 82.5 %  
 Area: 74.9 %
- **Set top box – indoor antenna**  
 Population: 83.8 %  
 Area: add 77.6 %
- **Set to box – rooftop antenna**  
 Population: 99.0 %  
 Area: 97.6 %
- **Out of Coverage**  
 Population: 1.0 %  
 Area: 2.4 %



Tight synchronization  
of neighbor cells

Increased interference  
robustness

Improved border  
coverage due to lower  
TX powers and small  
cell sizes

1st live field trial with  
broadcasters

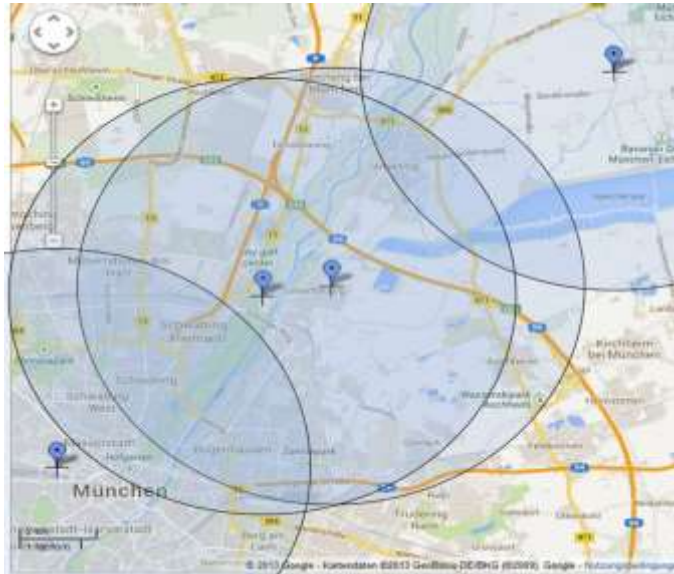
# First successful field trial in Germany

Implemented with commercially available eNodeB hardware



Q2/14: Field trial  
Prototype with SFN\*  
available

Q4/14: Demo center  
Available for customer  
visits



## Configuration

- > eMBMS and SFN\* on Nokia Flexi Multiradio 10 BTS
- > Core network emulation
- > 4 cells in SFN\* operation, 4 locations, QC terminals
- > UHF spectrum, band 28, to analyze coverage conditions
- > 10 MHz (several SD channels, some HD channels)

\*) SFN: Single Frequency Network

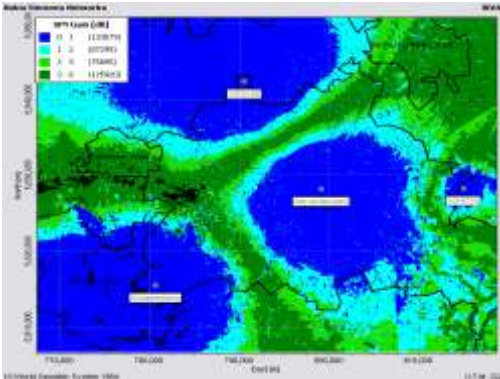


# Architecture

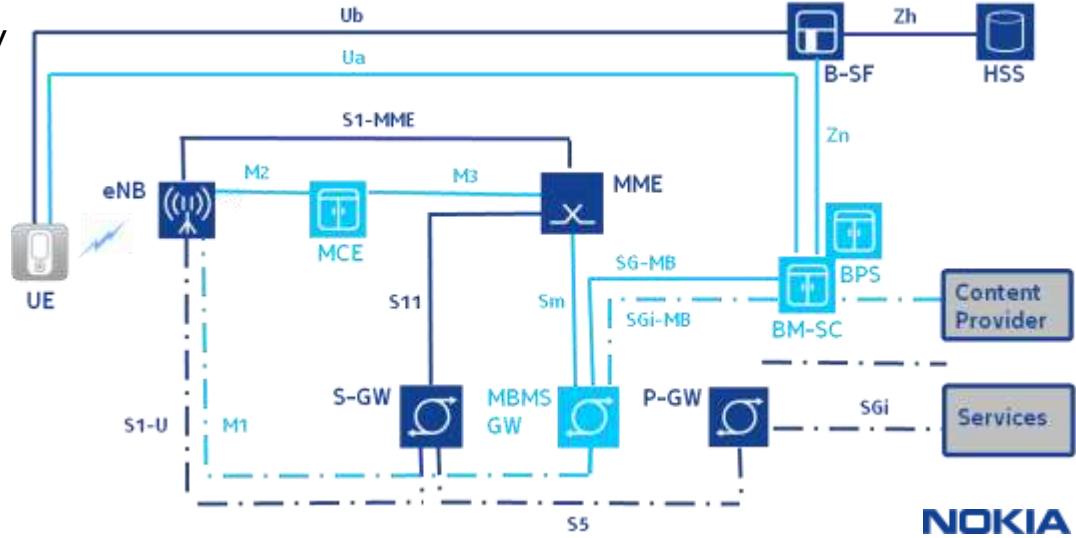
- BM-SC:** Broadcast Multicast Service Centre
- BPS:** Broadcast Provisioning System
- B-SF:** Bootstrapping Server Function
- eNB:** Evolved Node B
- HSS:** Home Subscriber Server
- MCE:** Multi-cell/multicast Coordination Entity
- MME:** Mobile Management Entity
- P-GW:** Packet Data Network Gateway
- S-GW:** Serving Gateway
- UE:** User Equipment

## LTE MBMS

- utilizes existing LTE network
- single frequency layer only
- system bandwidths of 10MHz, 15MHz, and 20MHz
- time & phase synchronization in FDD/TDD MBMS synchronization area
- max 8 active MBMS sessions in parallel



FutureWorks 2014



# Finally the Holy Grail for broadcast has been found: LTE 4 broadcast

## Broadcasters

Define programs and retain editorial responsibility for the content

## End users

can enjoy a multitude of services on any device at any time

## Mobile operators

reuse existing infrastructure to provide cost-efficient large-area coverage

## Regulators

allocate spectrum to enable an Integrated UHF Multimedia Network

**NOKIA**